CLAIMS

What is claimed is:

1. An isolated direct-current-to-direct-current (DC-to-DC) converter, comprising:

a class-D amplifier configured to be driven by an alternating current (AC) input voltage and a DC input voltage, the class-D amplifier thus configured to generate an AC primary voltage;

a transformer having a primary winding configured to be driven by the AC primary voltage, the transformer thus configured to generate an AC secondary voltage at a secondary winding;

a rectifier configured to be driven by the AC secondary voltage, the rectifier thus configured to generate a rectified voltage; and

a low-pass filter configured to be driven by the rectified voltage, the low-pass filter thus configured to produce a DC output voltage.

2. The isolated DC-to-DC converter of claim 1, wherein the AC input voltage is sinusoidal.

3. The isolated DC-to-DC converter of claim 1, wherein the AC input voltage is a four-bit approximation of an AC sinusoidal voltage.

4. The isolated DC-to-DC converter of claim 1, wherein the AC input voltage is a low-pass-filtered square wave voltage.

5. The isolated DC-to-DC converter of claim 1, further comprising an AC input voltage source configured to generate the AC input voltage.

6. The isolated DC-to-DC converter of claim 1, wherein the primary frequency of the AC input voltage is approximately 300 Hz.

7. The isolated DC-to-DC converter of claim 1, wherein the rectifier is a full-wave rectifier.

8. The isolated DC-to-DC converter of claim 1, wherein the rectifier is a half-wave rectifier.

9. The isolated DC-to-DC converter of claim 1, wherein the class-D amplifier drives a terminal of the primary winding with the AC primary voltage while maintaining a second terminal of the primary winding at a constant voltage.

10. The isolated DC-to-DC converter of claim 1, wherein the class-D amplifier drives the terminals of the primary winding of the transformer with voltages of equal amplitude and opposite polarity.

11. The isolated DC-to-DC converter of claim 1, wherein the class-D amplifier further comprises:

an electronic switch circuit configured to switch intermittently the first DC voltage, the electronic switch circuit thus configured to produce a switched DC voltage;

a pulse width modulator (PWM) configured to be driven by the AC input voltage, the PWM thus configured to control the electronic switch circuit; and

a second low pass filter configured to be driven by the switched DC voltage, the second low pass filter thus configured to generate the AC primary voltage.

12. The isolated DC-to-DC converter of claim 11, wherein the PWM operates at a frequency at least four times the primary frequency of the AC input voltage.

13. The isolated DC-to-DC converter of claim 11, wherein the second low pass filter removes harmonic components of the switched DC voltage equal to and greater than the switching frequency of the switched DC voltage.

14. The isolated DC-to-DC converter of claim 1, further comprising a feedback circuit configured to adjust the amplitude of the AC input voltage based on the magnitude of the DC output voltage in order to regulate the DC output voltage.

15. The isolated DC-to-DC converter of claim 1, further comprising a feedback circuit configured to adjust the magnitude of the DC input voltage based on the magnitude of the DC output voltage in order to regulate the DC output voltage.

16. A power supply employing the isolated DC-to-DC converter of claim 1.

17. An electronic device employing the isolated DC-to-DC converter of claim 1.

18. An electronic circuit for converting a first direct-current (DC) voltage to a second DC voltage, comprising:

means for generating a pulse-width-modulated voltage whose pulse width varies with an alternating current (AC) input voltage;

means for switching the first DC voltage based on the state of the pulse-width-modulated voltage to yield a switched DC voltage;

means for low-pass-filtering the switched DC voltage to yield a primary AC voltage;

means for applying the primary AC voltage to the primary winding of a transformer to yield a secondary AC voltage at a secondary winding of the transformer;

means for rectifying the secondary AC voltage to yield a rectified voltage; and

means for low-pass-filtering the rectified voltage to yield the second DC voltage.

19. The electronic circuit of claim 18, further comprising means for generating the AC input voltage.

20. A power supply employing the electronic circuit of claim 18.

21. An electronic device employing the electronic circuit of claim 18.

22. A method for converting a first direct-current (DC) voltage to a second DC voltage, comprising:

generating a pulse-width-modulated voltage whose pulse width varies with an alternating current (AC) input voltage;

switching the first DC voltage based on the state of the pulse-width-modulated voltage to yield a switched DC voltage;

low-pass-filtering the switched DC voltage to yield a primary AC voltage;

applying the primary AC voltage to the primary winding of a transformer to yield a secondary AC voltage at a secondary winding of the transformer;

rectifying the secondary AC voltage to yield a rectified voltage; and

low-pass-filtering the rectified voltage to yield the second DC voltage.

23. The method of claim 22, wherein the AC input voltage is sinusoidal.

24. The method of claim 22, wherein the AC input voltage is a four-bit approximation of an AC sinusoidal voltage.

25. The method of claim 22, wherein the AC input voltage is a low-pass-filtered square wave voltage.

26. The method of claim 22, further comprising means for generating the AC input voltage.

27. The method of claim 22 wherein the primary frequency of the AC input voltage is approximately 300 Hz.

28. The method of claim 22, wherein the frequency of the pulse-width-modulated voltage is at least four times the frequency of the AC input voltage.

29. The method of claim 22, wherein the rectified voltage is full-wave rectified.

30. The method of claim 22, wherein the rectified voltage is half-wave rectified.

31. The method of claim 22, wherein the second low-pass-filtering step removes harmonic components of the switched DC voltage equal to and greater than the switching frequency of the switched DC voltage.

32. The method of claim 22, further comprising altering the primary AC voltage based on the magnitude of the second DC voltage in order to regulate the second DC voltage.

33. The method of claim 32, wherein the altering step is accomplished by modifying the magnitude of the first DC voltage.

34. The method of claim 32, wherein the altering step is accomplished by modifying the amplitude of the AC input voltage.